

ISS Exploration Platform Concept

Michael Raftery
Boeing ISS Deputy Program Manager

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ISS Use for Exploration

Defense, Space & Security
Space Exploration
International Space Station

- For the past year, the ISS Industry partners have been studying potential exploration scenarios that use ISS as a base camp for exploration
- This study has investigated a broad range of mission classes from NEAs to Humans on Mars

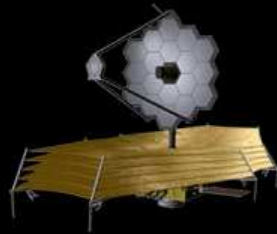


Flexible Path for Exploration

NEO



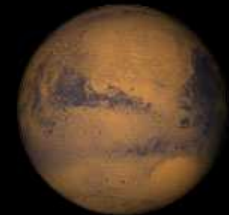
Telescopes



Moon



Mars

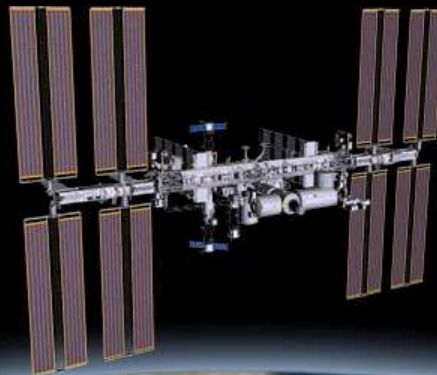


L1

L2

Exploration
Platform

ISS



ISS Exploration Platform

Purpose & Functions



HSF Exploration Gateway at EML1/2

Primary destination for initial flights beyond LEO

- Provides a habitat destination for MPCV & Soyuz for medium duration stays
- Enables early characterization of environment outside radiation belts

“Local” control of Lunar robot assets

- Allows the use of tele-presence robots
- Development of remotely controlled ISRU capabilities critical for Mars exploration

Gateway for a mission to a Near Earth Asteroid

- Enables assembly, test, & checkout of NEA spacecraft prior to departure
- Enables lowest mass mission spacecraft which will shorten trip times to / from NEA

Base for re-usable Lunar lander

- Allows re-use of expensive lunar lander assets
- Enables much more flexible mission operations for lunar access and “anytime return”

Gateway for a human mission to Mars

- Enables assembly, test, & checkout of Mars spacecraft prior to departure
- Enables lowest mass mission spacecraft which will shorten trip times to / from NEA
- Safe orbit for nuclear tug assets

Service Station for Telescopes at SEL2

Repair and refueling for high value telescope assets

EML1 Exploration Platform

Functional Requirements



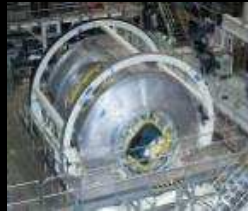
	Near Term DSH Destination	Base for Lunar Telerobotics Assets	Gateway for a NEA Mission	Base for Reusable Lunar Lander	Gateway for a Mars Mission	Service Station for SEL2 Telescopes
Life Support Systems	+	+	+	++	++	+
Docking Interfaces	2	2	3	4	6	3
Robotics - SSRMS			+	+	++	++
Robotics - SPDM / RRM			+	+	++	++
Robotics - Telepresence		++		+	+	++
ACS – RCS Propulsion	+	+	+	+	+	+
ACS – CMGs			+	+	+	++
Translation Propulsion	+	+	++	++	++	++
Propulsion Refueling	+	+	++	++	++	++
Contingency EVA			+	+	++	++
Ku / Ka Band Comm		++	+	++	++	++
Electrical Power / Thermal	+	++	+	++	++	++

+ = Need it
++ = Really Need it

ISS Exploration Platform Functional Allocation

Docking
Interfaces

Structural
Interfaces



OR



Docking Node

Crew
Habitation
& Life Support

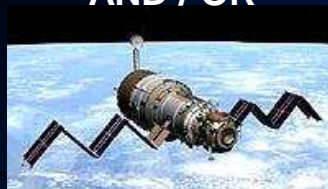
Airlock
(Contingency EVA)



AND / OR



AND / OR



AND



Habitats

Electrical
Power

Comm

Heat
Rejection

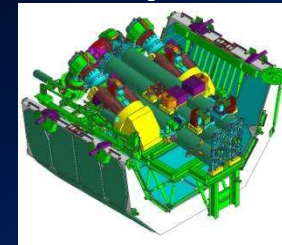
Attitude
Control

SSRMS

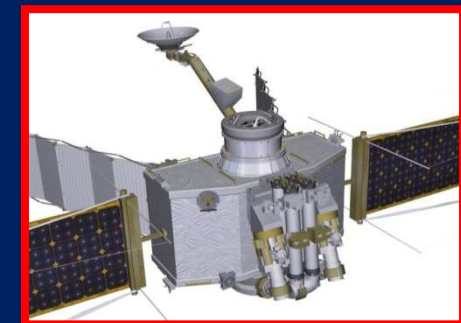


Shuttle
OBS

+



SSRMS
On
SLP



Utility Module

Long Duration Habitat Evolution

• Construction



Block 1
ISS-EP
(MPLM Derived)



Block 1a
NEA TransHab
(MPLM Derived)



Block 2
Mars TransHab
(Composite Shell or Inflatable)



Block 3
Mars SurfaceHab
(Composite Core, Inflatable Shell)

• Subsystems

ECLSS

- 3 crew, 3 months
- Replenishment
- Partially Closed

INTERFACES

- CBM/NDS

EVA

- Airlock

ECLSS

- 3 crew, 12 months
- No Replenishment
- Partially Closed

INTERFACES

- NDS on both ends

EVA

- Airlock

ECLSS

- 3 crew, 9 months
- No Replenishment
- Partially Closed

INTERFACES

- NDS on both ends

EVA

- Airlock

ECLSS

- 3 crew, 12 months
- No Replenishment
- Partially Closed
- Surface Hygiene Facilities

INTERFACES

- NDS on one end

EVA

- Airlock/Suit Lock

Mission Derived Requirements

- **Man tended: periodic presence of crew**
- **ECLSS sized for 3 crew; Surge to 6 crew for 14 days**
- **Docking support for:**
 - Simultaneous: MPCV, Soyuz, Lander, SEP Tug, Cargo module, & Spare
- **Propulsion / ACS:**
 - Station keeping RCS; refuelable; CMGs
 - Translation >300m/s; refuelable
- **Robotics:**
 - Berthing & assembly via SSRMS
 - Repair ops via SPDM / RRM type
 - Tele-presence workstation
- **EVA:**
 - Capability for contingency EVA; 2 EMUs
- **Communication:**
 - HDTV video transmission
 - High reliability command and control link
- **EPS & Thermal:**
 - Solar arrays: 30KW
 - Heat rejection: NH3 - 20KW

ISS Exploration Platform

Four Basic Elements

Docking Hub



- Structural Hub
- Docking Interfaces
- SSRMS Base
- CCAA

Utility Module



- 30 KW Power
- 20 KW Heat Rejection
- SSRMS launch carrier
- Ku / Ka Band Comm
- CMGs
- RCS
- Translation Propulsion (Hall Thrusters)
- Airlock for 2 EMUs

ISS-EP Hab



- Evolved ECLSS
- Central Computer
- Robotics Control

Zvezda 2

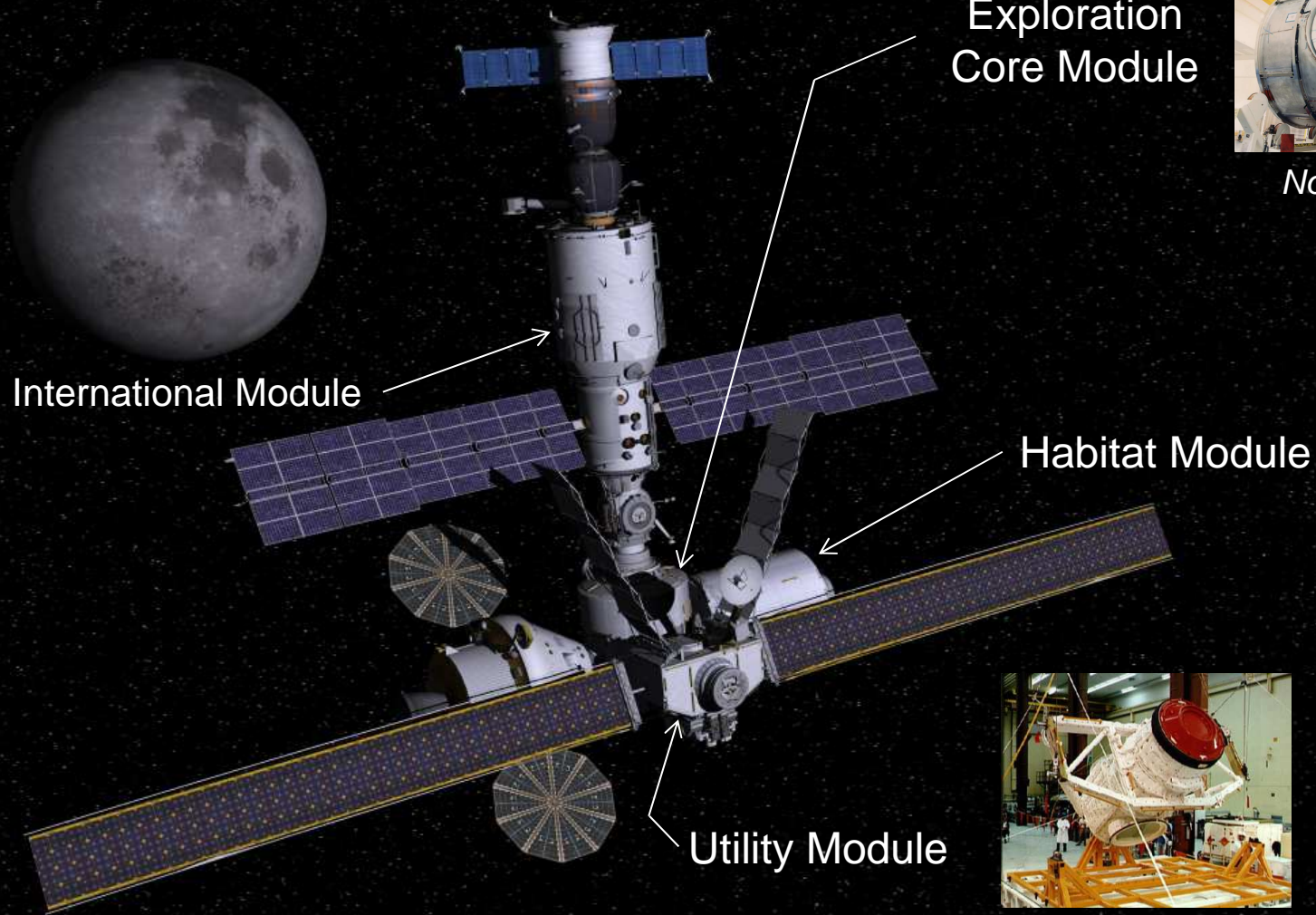


- Evolved ECLSS
- RCS
- Translation Prop
- Soyuz Docking

ISS-Exploration Platform

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Space Exploration

International Space Station



Node STA



MPLM (2 Avail)



Orbiter External Airlock (2 Avail)

Assembly at ISS

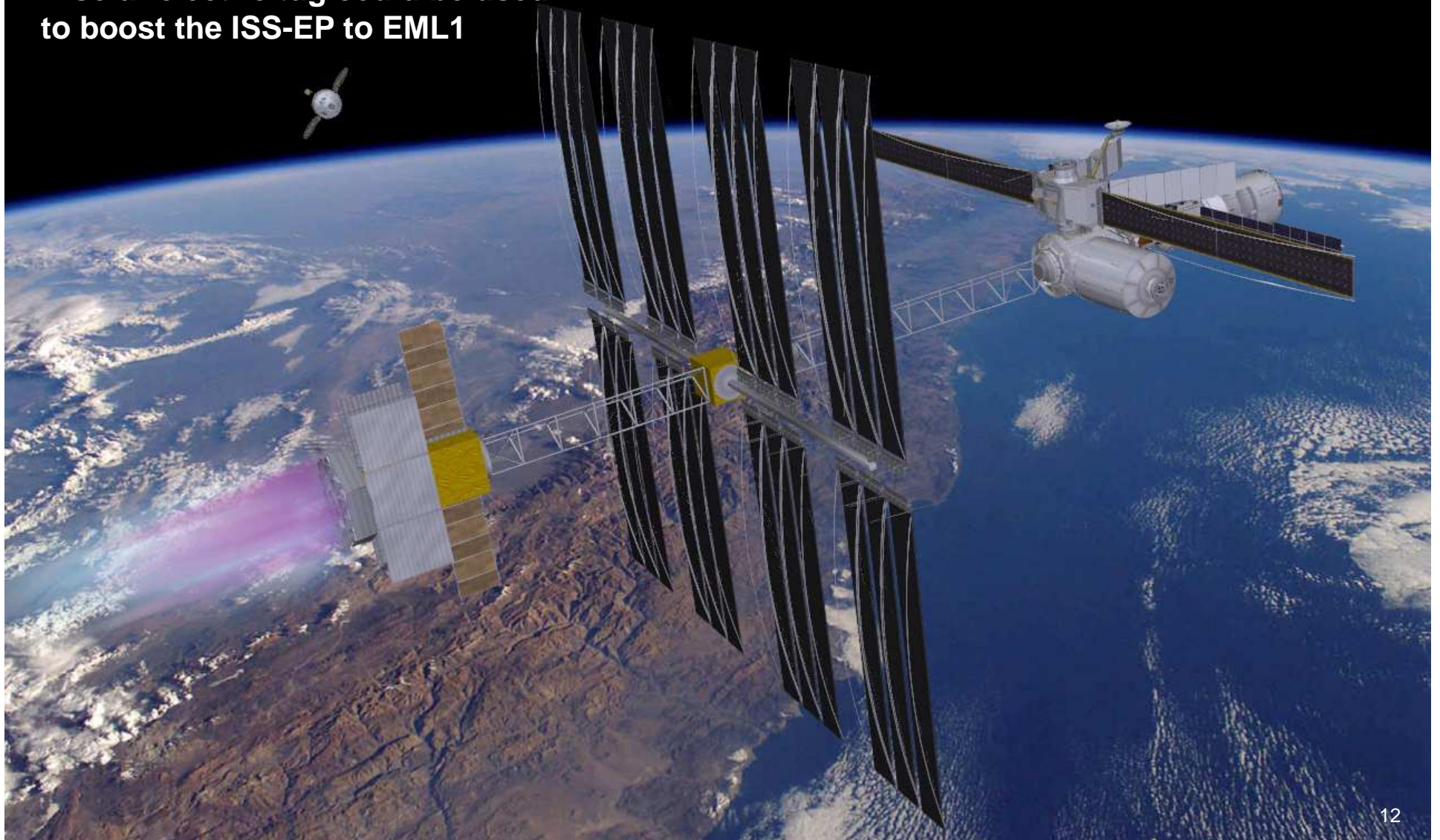
Assembly at ISS would allow build and test to occur over a period of several years while MPCV and SLS development are being completed

ISS-EP SEP Boost to EML1

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Space Exploration

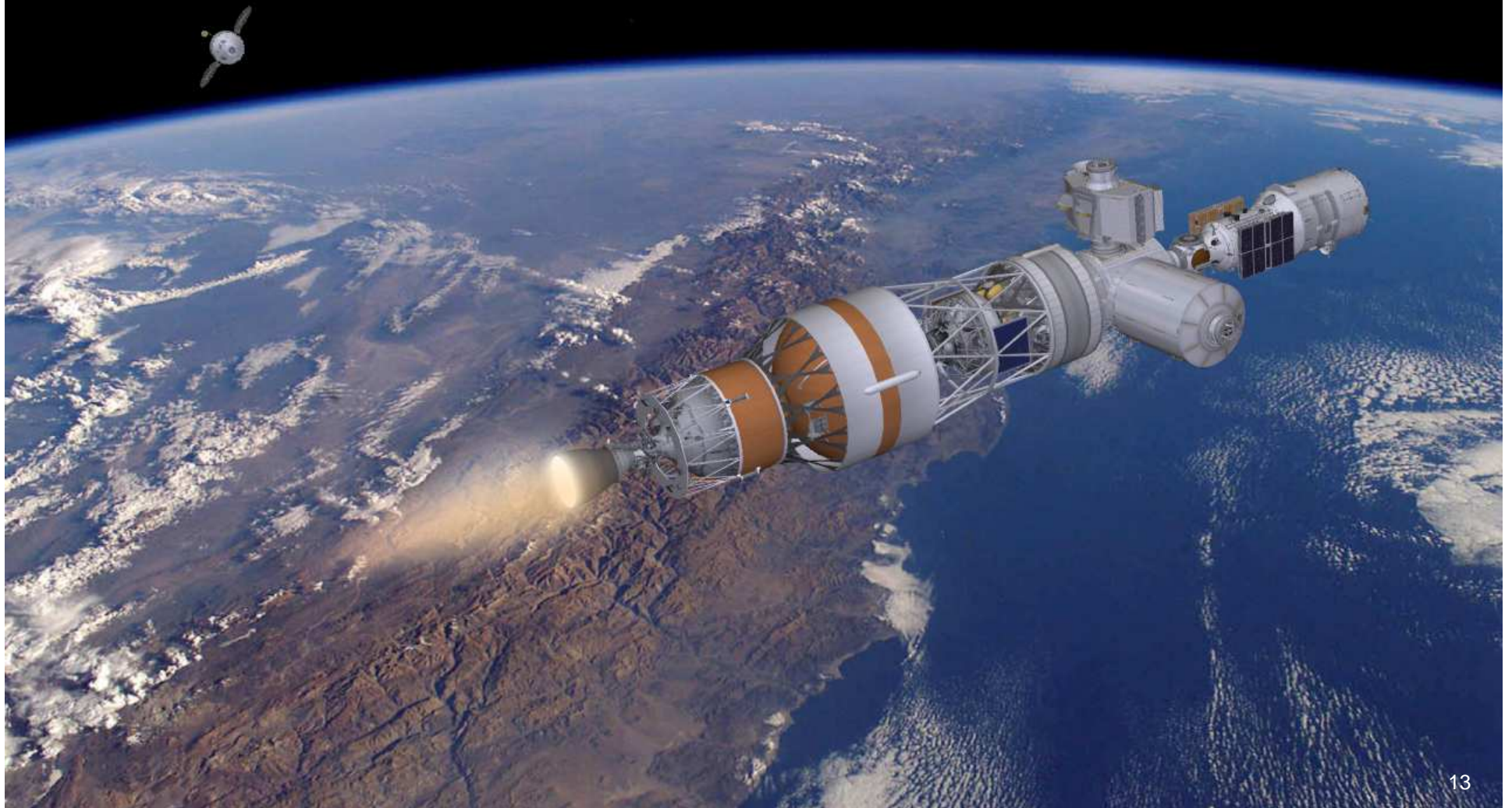
International Space Station

**A solar electric tug could be used
to boost the ISS-EP to EML1**



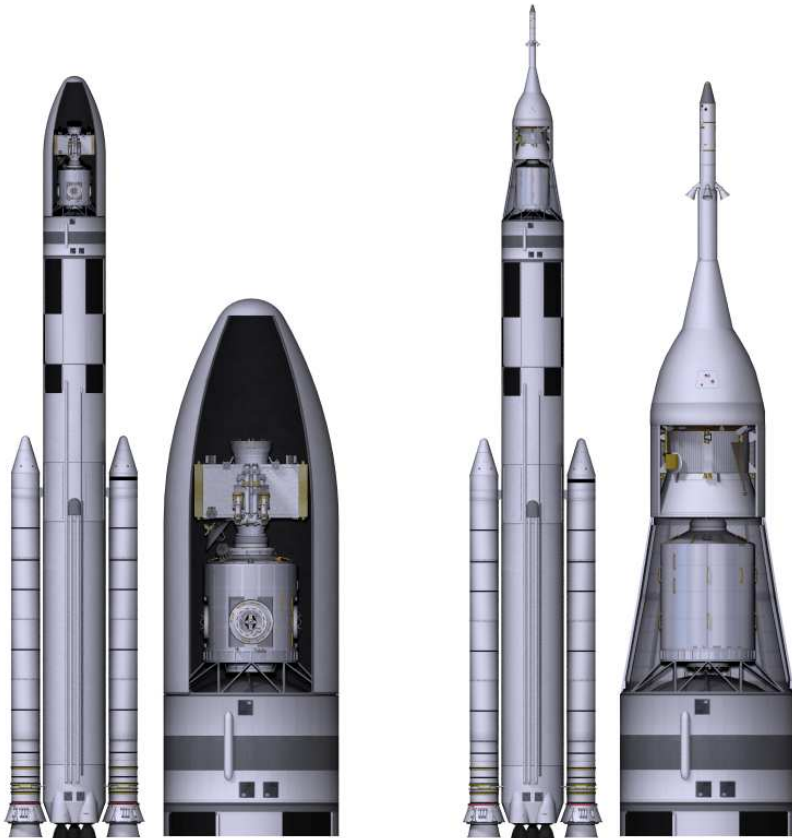
ISS-EP Chemical Boost to EML1

**If the SEP tug is unavailable then the SLS
could be used to boost the ISS-EP to EML1**



Direct launch of ISS-EP to EML1

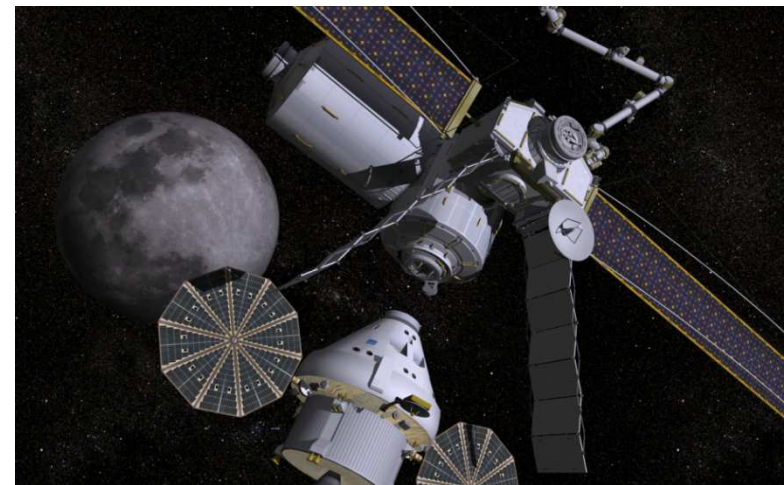
- The ISS-EP could also be launched directly to EML1 with two SLS launches
- A commissioning crew would be sent on the second launch to activate the platform and prepare it for mission support



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Before Crew Activation



After Crew Activation

ISS Exploration Platform (ISS-EP) at EML1

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Space Exploration

International Space Station

Two separate means should be provided for Crew access to the ISS-EP

SLS-MPCV

Soyuz???

